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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/437,006 11/09/99 ZHENG

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IM22/0921

EXAMINER

BROWN, C

ART UNIT

PAPER NUMBER

1765

DATE MAILED:

09/21/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trad marks

Office Action Summary

Application No.
09/437,006

Applicant(s)
Zheng et al.

Examiner
Charlotte Brown

Group Art Unit
1765



☒ Responsive to communication(s) filed on Nov 9, 1999

☐ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 35 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claim

☒ Claim(s) 1-21 is/are pending in the application

Of the above, claim(s) _____ is/are withdrawn from consideration

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 1-21 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☒ None of the CERTIFIED copies of the priority documents have been

☐ received.

☐ received in Application No. (Series Code/Serial Number) _____.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

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DETAILED ACTION

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grimbergen et al. (US 6,081,334) in view of Witek et al. (US 5,627,395).

Grimbergen discloses an endpoint detection system for etching semiconductor layers. A substrate comprises a silicon wafer. A thin silicon oxide (gate oxide) layer is formed over the substrate. A polysilicon layer, a gate electrode layer, is deposited over the gate oxide layer. A titanium nitride antireflective layer is deposited over the gate electrode layer. A photoresist layer is formed over the antireflective layer (Column 5, lines 51-67). A substrate processing method is disclosed that etches a polysilicon overlayer on a gate oxide without etching or damaging the underlayer. Suitable etchant gas include HCl, HBr, Cl₂, O₂, He and mixtures thereof. The polysilicon layer can be etched in more than one etching step with the etching gas composition being changed during each etching step in order to stop the etching process without etching through the oxide underlayer on the substrate. The main etch stage was stopped by an endpoint detection system immediately before the polysilicon layer was completely etched through. An overetch stage was performed to etch through the residual portion of the polysilicon layer. In the

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main etch stage, the polysilicon layer was plasma etched using an etchant gas comprising Cl_2 , HBr , and He-O_2 (Column 18, lines 14-40).

Unlike the claimed invention Grimbergen does not disclose a method in which a second plasma etch is performed that includes HBr and nitrogen.

Witek discloses a method for forming a vertically raised transistor. A substrate for semiconductor processing is provided. A dielectric layer is formed over the substrate. The dielectric layer is preferably a TEOS based oxide or a silicon dioxide layer. A conductive layer is deposited over the dielectric layer. The conductive layer is preferably a polysilicon layer. A mask layer is deposited over the conductive layer (Column 4, lines 18-65). A isotropic etch step is used to laterally recess the sidewalls of the conductive layer (Figure 2). This reads on the applicant's limitation of selectively etching the device layer to form a pillar structure. An isotropic second etch step is also used to laterally recess the sidewalls of the conductive layer. Polysilicon may be etched using an HBr/Cl_2 plasma or a $\text{CF}_4/\text{oxygen}$ environment. The plasma environments may contain one or more of the inert carrier gases such as Ar , H_2 , He , N_2 , or a like inert carrier gas (Column 5, lines 24-33).

It is the Examiner's position that a person having ordinary skill in the art would have found it obvious to modify Grimbergen by adding nitrogen to the second etch chemistry since Grimbergen uses a HBr/Cl_2 plasma in the second etching step used to etch the device layer and the addition of nitrogen, a carrier gas, to the plasma environment as taught by Witek would have been anticipated in order to produce an expected result.

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3. Claims 8-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grimbergen et al. (US 6,081,334) and Witek et al. (US 5,627,395) as applied to claims 1-7 above, and further in view of Witek et al. (US 5,627,395).

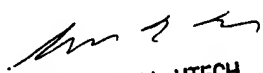
Witek differs from the claimed invention by failing to specify the recited processing parameters (i.e. an etch chemistry including less than ten percent of nitrogen) but it is the Examiner's position that a person having ordinary skill in the art at the time of the claimed invention would have found it obvious to modify Witek by attempting to optimize same by conducting routine experimentation.

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. (Huang et al. US 5,837,428)

5. Any inquiry concerning this communication from the Examiner should be directed to Charlotte A. Brown whose telephone number is (703) 305-0727.

CAB

September 19, 2000


BENJAMIN L. UTECH
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